

BUNDH BREEDING – REJUVENATION OF A NOVEL TECHNOLOGY FOR QUALITY SEED PRODUCTION BY THE FISH SEED PRODUCERS OF BANKURA DISTRICT IN WEST BENGAL, INDIA

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Abstract - Bundh breeding is a traditional method for quality seed production in captivity and practiced by fish seed producers of Bengal since long time. The seeds produced through such method, due to its quality had a considerable demand in the country. After the introduction of induced breeding technology, the farmers were interested in procuring seed produced out of induced breeding mainly to overcome the transportation hazards. The farmers again realized that the seeds procured from hatcheries are not only qualitatively inferior but interfere with production. With this realization, the fish breeders of Bankura district of West Bengal, India started bundh breeding with a new approach and modified form. The seeds produced at present can be compared to wild collection and are more economic compared to induced breeding. This has revolutionized the quality seed production through bundh breeding in Bengal.

Keywords: Bundh breeding, Induced breeding technology, Quality seed.

Introduction

Fish is the cheapest and easily digestible source of animal protein not only in India but in almost all the developing and developed countries of the world in various forms. Production of fish depends primarily on the availability of good quality of seed. It is now a realized fact

that sustainability in aquaculture primarily depends on quality seed production and its steady supply to farming sector. As the fish seed is the major input for fish farming, there is always a growing demand of quality fish seed. In early fifties and before more than 70% of seed required for cultural practice had been contributed by bundh breeding of Bankura and Medinipur district (Khanna, S.S, *An Introduction to Fishes*, 1992, pp 506 – 512) due to the presence of undulating terrain with vast catchment area in both the districts. Bankura was pioneer in respect of production of fish seed of Indian major carp by simulating natural conditions in captivity. The seeds produced through such technology is being considered as good as the seeds collected from nature in terms of quality and productivity, particularly when the natural source is declining fast due to several changes in physico-chemical and biological properties of water and air, the demand for such seed is again gaining importance.

Bundh are nothing but specialized types of pond in the vicinity of vast catchment area where riverine conditions are simulated during breeding season due to steady and rapid flow of rain water from the catchment area towards the pond. These ponds are constructed in the midst of a vast low lying area with proper embankment to receive large quantity of rain water from catchment area after heavy shower. Bundh are of two types one is dry bundh or seasonal bundh and another is wet bundh or perennial bundh (Dhote, A.K. *Fish Breeding*, NCERT ; pp

33 – 43) A dry bundh has been described as a shallow depression enclosed by an earthen wall (locally known as bundh) on three sides, which receives fresh rain water from the catchment area during the monsoon season. Such impoundments, which remain more or less dry during a greater part of the year, are known as dry bundh. The topography of the land has a great role to play in the location and distribution of dry-bundh.

The wet bundh is a kind of small or large perennial pond or tank, in the midst of a low-lying area, bounded on three sides by high embankments. In summer, generally a quarter parts of most of these bundh dries up, while the central part, deeper than the surrounding area always holds some water. These ponds are stocked with brood fish for use in breeding season. During the monsoons, when water from the catchment areas rushes towards the central part in the form of streamlets, the fish move towards the surrounding shallower region of the pond (locally known as moan) and perform sex ply and spawn within 4-5 hours. The fertilized eggs are collected with gamcha or scoop net and are placed in hatching hapa or hatching pits constructed around the pond by removing required amount of surface soil. Before the introduction of hypophysation technique this was the main source of fish seed supply not only to state but to the whole country and the farmers preferred it because the seeds are as good as the natural seed collected from river.

With the introduction of induced breeding technology, the easiest procedure for the production of quality seed in captivity, farmers of Bengal, in particular, adopted the technology prior to other states and shouldered the responsibility for production of quality seeds in captivity. Primarily farmers, who were initially depended on the seed source (70 %) from Bundh breeding except natural source, started depending on the seeds developed through hypophysation, may be due quality assurance, easy availability and less price.

For a considerable period this traditional and novel technology of quality seed production sector faced a setback following the criteria mentioned along with some other associated problems. Now, when it is realised that due to profit making approaches of fish breeders, the seeds produced out of induced breeding lost its quality

and are creating a negative impact on culture practice, the importance of Bundh breeding gaining importance with a new look. With these understanding the fish breeders of Bankura and Midinipur district started raising seed of carps with scientific approaches of progame , but till today the practice of bundh breeding of Bankura district specially in Panchmura area is one which was being practiced in early fifties with a traditional mode. The peculiarity is that the soil of this area is characteristically different from other areas of the district. The soil when mixed with water in hatching pond it offers buoyancy to the fertilized eggs and the eggs remains floating .This enhances hatching rate. Otherwise the fertilized eggs settles at the bottom and hatching is impaired.

Site Description

The breeding site is located in the villages of Panchmura, Dhobajor , Bapmara, Radhanagar, P.O- Panchmura, P.S- Taldangra under Taldangra Gram Panchayet, in khatra sub-division of Bankura District in West Bengal , pin code – 722156, (Fig.1)India. Geographically the said places are located 22.9667⁰ North and 87.1667⁰ East. It has an average elevation of 68 meter (223 ft.).The bundh are situated 33 Km. from Bishnupur Railway station and 14 Km. from Taldangra, 43 Km from Bankura Railway station by road. Nearest Railway station is Piardoba of South Eastern Railway which is 22 Km. away from panchmura, the Ideal breeding place of Indian major carp.

Fish farmers of Panchmura area of Bankura district practice this age old novel technology of quality seed production in a modified form considering the need of the time. The fish breeders mainly undertake breeding of Indian Major Carps (IMC) but sometimes exotic carps like silver carps and grass carps are considered depending on the mandate from the farmers. The study is based on an exclusive field survey and farmers Interview following a questioner schedule.

to the bundh, but in the absence of stocking pond brooders are transferred to the breeding site during the time of breeding either by cycle or van rickshaw with the help of large sized aluminum handi (20 lit capacity) with an opening of 20 inches.



Fig.1. Location of Panchmura in the map of Bankura district Present status and working principle of bundh breeding in Panchmura of Bankura district, West Bengal, India

Brood Stock Management

For any breeding programme brood stock management is considered to be the primary criteria on which success of the seed production at desired level is achieved. Bundh breeding conducted during pre-monsoon (month of March to May), monsoon (month of June & July) and post-monsoon period (month of August) and for this brood stock management is a continuous process in the area of study. only few big farmers have their own land (bundh) including stocking pond(Plate.1,a&b) and breeding pool, but maximum number of farmers (small and marginal) adopt bundh on lease during breeding season and used to collect brood from leased bundh or collect matured brood fish from neighboring village . Prior to breeding the brood fish are stocked in ponds adjacent



Plate.1, a&b. Stocking pond in Panchmura village of Bankura district

Breeding Practice

For success in breeding, good breeding ground & favorable climatic condition is the primary criteria .Again the brood fish should be at the ripe stage of maturity ,and if not , breeding will not be successful instead of favorable criteria. The fish breeders generally, adopt natural breeding and stripping is a rare occasion. Sympathetic

breeding, in which small number of fishes of a breeding group are induced and are released in bundh with non-induced one, so that non-induced fish will be stimulated by the spawning behavior of induced fishes. This practice reduces not only the hazards to induce individual fish but to some extent reduce the cost. Compare to induce breeding the seed produced through Bundh breeding qualitatively more superior than that of induced breeding. The fish farmer should be encouraged to stock the seeds collected from Bundh and the seeds of induced fish breeders who are produce quality seeds. Govt. and institutional level initiative is needed to create overall appraisal regarding collection of quality seeds.

Preparation of breeding bundh

Bundh is a shallow pond (length-50ft × width-30ft × depth-6ft) having slope from one end to other (Plate. 3 & 4) in such that in the upper end water depth is 4ft.,while at the lower end it is 6ft and having an embankment. Generally the breeding ground is sandy. Water is supplied to the bundh from shallow pump or from the nearby rivulet by diesel pump or by electric motor pump which is available. Water height maintained 2.5 ft at the upper end and 3.5ft at the lower end. Along with the inflowing water towards bund, the farmer used to mix one type of special soil, available in this area and collected from 10 ft below the surface soil. They are convinced that this soil imparts buoyancy to the fertilized eggs to float in water after spawning. According to the fish breeders, this also increases hatching percentage in bundh (Plate.2). The breeding bundh has the capacity to hold about 200kg.to 300 kg. Brood fish for single game. Although the number and weight of brood fish released to the breeding pond depend upon the availability of brood fish and demand of fish seed. After completion of one game entire water is drained out and the breeding ground is washed thoroughly and left for one or two days for removal of bad odor and again prepare the bundh for next cycle.



Plate.2. Soil available in the area useful for spawning and hatching, particularly prohibit clamping of eggs.



Plate.3 Farmers' engaged in preparation of



Plate.4. Sun drying of breeding bundh breeding bundh.



Plate. 6 Netting for collection of brood fish

Transfer of brood fish

As soon as the preparation of the breeding pool (pond) is completed, the farmers collect brood fish from stocking bundh and release selected mature broods in the ratio of 1:1 (male: female) in the breeding bundh. After release water supply is maintained in the morning between 6 a.m. to 10am (Plate.5). This facilitates fish movement as well stimulate breeders to go for breeding following courtship.



Plate. 5 Water inlet into the breeding bundh



Plate.7,8. Selection of mature broods for Injection



Plate. 9 Sun drying of net

Inducing agent

The fish breeders of Panchmura areas are now using WOVA-FH (chemically salmon Gonadotrophin Releasing Hormone Analogue and Domperidone), a synthetic inducing agent. Just before administration of injection, and 4 hours after their collection, the brooders (both male and female) are caught from the brooders pond and used to keep them in net or hapa to be taken for injection at ease (Plate.7). The fish breeders exploit sympathetic breeding by injecting only 90 brood fish out of 300 considered for a single game. For this they prepare 90 ml of diluted solution by adding 80 ml of saline water to 10 ml of inducing agent (WOVA-FH). Now, out of 300 broods (150 pc male+150pc female) the fish breeders inject the diluted inducing agent only to 90 pieces (Plate. 10,a&b) i.e. only 30% of total brood fish are induced (30 piece male + 60 piece female). Both the male and females are injected only one dose at the rate of 1 ml. diluted solution per kg. body weight in case of Indian Major Carp. Although percentage of brood fish to be injected and dose of inducing agent varies depending upon temperature, maturity of brood fish and the period of breeding season(i.e., pre-monsoon, monsoon and post-monsoon).



Plate.10, a



Plate.10, b

Plate.10, a & b. Injection of WOVA-FH to a catla fish on the bank of a breeding bundh in panchmura.

Breeding, spawning &Fertilization

After injection the brooders are released again into the breeding bundh (Plate.5 & 6) and within half an hour, the injected male and female exhibit breeding behavior which include sporting. Rapid underwater movement followed by splashing of water is indicative of sporting mood of the breeders. Sporting continues for 2-3 hours in the shallow region of the breeding bundh having a depth of 1 ft. Breeding ends in spawning ,the females start releasing eggs at the shallow region and male being enticed started releasing milt over the eggs, which results in fertilization. Sometime spawning continues for 8 hours and both the sporting, spawning and fertilization is depended on temperature of air and water .Even after completion of spawning, the fish breeders allow the

brooders in the breeding bundh along with fertilized eggs for 3-4 hours and kept a strict vigil on the overall conditions of the pond. After sometime the breeders started stirring the water by moving within the pond for declamping the egg mass. The fish breeders conduct this stirring movement in the midnight of first day or day 1. (Plate. 11, a & b).



Plate.11, a



Plate.11, b

Fig.11,a&b. Water movement by farmers leg to protect settlement of egg in hatching bundh

From 2nd day onwards as the development of egg proceeds, a point appears in its middle and after 2 to 3 hours, the point changes to a Bengali 5 like structure. Along with this the embryo indicates rapid movement within the egg shell. Immediately the fish breeders started transferring brood fish into stocking pond and release the developing eggs into hatching bundh after collecting the

eggs by net(Plate. 12,a&b). The farmers of Panchmura area transfer the egg from breeding bundh to the hatching bundh by cycle messenger (Plate.14) with aluminum handi (Plate.13, a&b).



Plate.12,a&b. Collection of egg from a breeding bundh by net.



Plate.13,a&b. Loading of developing eggs in alluminium handi for its transfer to hatching bundh



Plate.14. Egg transfer to the hatching bundh by cycle carrier

Hatching

Hatching is a process by which spawn or hatchlings are released from the fertilized egg. For

hatching farmers of Panchmura area follow the following process to get maximum result.

Preparation of hatching bundh

Hatching bundh is nothing but a series of muddy or earthen pits of various sizes like 38ft. ×15ft. ×4ft., 23ft. ×15ft. ×4ft., 12ft×7ft×4ft. Bottom of the hatching bundh is convex in shape, and so hold more water bodies in the middle than its surroundings (Plate.15). The water depth of the hatching bundh is 2.5 ft in the middle and 1 ft in the surrounding. The water which is used for the hatching process is from shallow or nearby canal of rivulet. Before releasing eggs into the hatching bundh, the fish breeders allow the bundh to be sundried for 3 to 4 days (Plate.15) and fill it with water upto desired level as required for hatching (Plate.16). The fish breeders avoid use of any chemical, cleaning agent or any fertilizer.



Plate.15. Preparation of hatching bundh



Plate.16. Hatching bund filled with water



Plate.17. Cleaning of hatching bundh after completion of a Hatching for reuse

Hatching practice

After preparing of hatching bundh (Plate.17), the farmers release the egg to the bundh (Plate.18). The amount of egg released for hatching depends on the size of the bundh and environmental condition. They measure the egg by using a special aluminum handi (20" mouth size) that can contain about 20 liters of water (Fig. 13, a&b). In next day early morning within 5 a.m. to 8 a.m. farmers release the egg in the pre-selected hatching bundh. Farmers release 1 handi of eggs in 23ft. × 15 ft. × 4 ft. size bundh, 1.5 handi of eggs in 38 ft. × 13 ft. × 3ft. sized bundh and 0.5 handi in 12ft. × 7 ft. × 4ft. sized hatching bundh. Within 20 minutes after releasing of egg to the hatching bundh, they supply water mixed with special soil (and increase the height of water body about 4 inches. In a regular interval they examine the egg in the hatching bundh and wait for the time when the embryo within the egg exhibit quivering movement. From 9 a.m. onwards they enter into the bundh and move the egg in the water by their leg with one hour interval to avoid settlement of egg and maintain temperature to avoid excess heating of upper layer of the water body (Plate.19). But in the month of May and June from 10 a.m. to 3 p.m.

farmers make a shade by palm leave (Fig.20, a&b) to avoid excess heat. When the embryos exhibit rapid twitching movement, the fish breeders supply more water to the bundh to complete hatching. It takes 6 to 7 hours for completion of hatching practice after releasing of egg to the hatching bundh. It is noted that for getting maximum result in hatching in this place the congenital temperature for hatching of Indian major Carp should be 28⁰ C in water and 42⁰ C in air. The fish breeders started preparation of hatching bundh for the 2nd operation, immediately after the completion of first hatching. (Plate.17).



Plate.18. Fertilized Eggs in hatching bundh



Plate.19. Outlet for draining excess water



Plate.20,a&b. Farmers providing shades to the hatching bundh by palm leave for temperature regulation



Plate.21,a&b. Examination of egg at regular interval when hatching time approaches

Rearing of hatchlings

The hatchlings or spawn remain in the same hatching bundh for two days. Only water temperature is controlled by preparing a shade upon the bundh by palm leave (Plate.20, a&b). Water supply is necessary twice in a day for maintain the height of water bodies. During rearing the fish breeders make a regular examination of the developing hatchlings (Plate.21, a&b).



Plate.22. Rearing of hatchlings

Collection of hatchlings

From third day onwards since hatching, the hatchlings from different hatching bundh are collected and transferred into hatching hapa. The size of this earthen hapa is 18 ft. × 10 ft. × 4 ft., but it also varies depending upon their availability of the hapa. In pre-monsoon period the carrying capacity of the hapa is 30 bati (135ml. /bati), whereas in monsoon period it is 40 bati. (One bati contain about 40000 to 50000 spawn, age about 3 days)

Production of hatchlings

In pre monsoon period hatchling production is 9 to 10 bati (135 ml.) per handi of egg. Whereas in monsoon period the production is much higher than pre-monsoon period (about 10 to 12 bati per handi of egg).

Marketing of spawn or hatchlings

On the third day (in hatching bundh) afternoon the hatchlings are counted by special bati (Plate.23 &24) after collecting it from hapa and packed with oxygen in plastic bag for marketing. The packaging of three days hatchling or spawn (size about 5 to 6 mm.) of Panchmura area is made either by oxygen packing in plastic bag (Plate.25). Each bag can hold one bati of spawn or by aluminum handi (each handi contain one bati of spawn).



Plate.23. Collection of spawn from hapa
Plate.



24.measurement of spawn for sale



Plate.25.Packing of spawn for transport

Reference

1. Dhote, A. K . *Fish Breeding*, NCERT ; pp 33 – 43
2. Khanna, S.S, *An Introduction to Fishes*, 1992, pp 506 – 512